

Permethrin for scabies in children

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ABSTRACT

QUESTION I frequently see children with scabies in my practice. A variety of medications are available to treat scabies. Permethrin is one of the most common medications used. Is permethrin a safe and effective option for children?

ANSWER Scabies is a common parasitic skin infection. It is highly prevalent in young children. Topical permethrin (5% cream) is a safe and effective scabicide in children. It is recommended as a first-line therapy for patients older than 2 months of age. Because there are theoretical concerns regarding percutaneous absorption of permethrin in infants younger than 2 months of age, guidelines recommend 7% sulfur preparation instead of permethrin.

RÉSUMÉ

QUESTION Dans ma pratique, il m'arrive souvent de voir des enfants souffrant de la gale. Divers médicaments sont offerts pour le traitement de la gale. La perméthrine compte parmi ceux les plus souvent utilisés. La perméthrine est-elle un choix sûr et efficace pour les enfants?

RÉPONSE La gale est un problème courant d'infection parasitaire de la peau. Elle est très fréquente chez les jeunes enfants. La perméthrine sous forme topique (crème à 5%) est un scabicide sûr et efficace pour les enfants. Elle est recommandée comme thérapie de première intention pour les patients de plus de 2 mois. En raison des préoccupations théoriques concernant l'absorption percutanée chez les nourrissons de moins de 2 mois, les guides de pratique recommandent d'utiliser plutôt chez ces patients une préparation de soufre à 7%.

Scabies is a common parasitic skin infection caused by the *Sarcoptes scabiei* mite, resulting in an intensely pruritic skin eruption with a characteristic distribution pattern.¹ It is common worldwide, with an estimated 300 million people infected each year.² It is highly prevalent in children younger than 2 years of age.^{2,3}

Treating scabies in infants and children is challenging. Many drugs used in adults cannot be used in children because of diverse safety profiles.² Further, little research compares the safety and efficacy of scabies treatments in infants and small children.^{1,4} Various agents, most of which are topical, have been used to treat scabies, including sulfur, gamma benzene hexachloride (lindane), crotamiton, benzyl benzoate, malathion, ivermectin, and permethrin.⁴

Sulfur (5% to 10%) in an ointment base is safe for infants and children.^{1,2} The main disadvantage is that it is unpleasant to use—smelly and cosmetically not acceptable to many patients.² Crotamiton 10% cream is approved by the US Food and Drug Administration for treatment of scabies in adults, but there is very little research on its use in children.^{5,6} Gamma benzene hexachloride 1% lotion (lindane) is recommended as second-line therapy for scabies in children.^{1,3} However, several reports exist on central nervous system toxicity presented as nausea, vomiting, headache, irritability, insomnia, and seizure. Seizure and death have been reported in young children following oral ingestion, overexposure, or altered skin barrier.^{3,5,6}

Benzyl benzoate and malathion are not available in Canada.^{3,6,7} Ivermectin, the only oral medication used to treat scabies, is not licensed in Canada.^{1,6,8}

Permethrin is a synthetic pyrethroid applied as a topical 5% cream for treatment of scabies.⁴ It is approved by

the Food and Drug Administration in patients older than 2 months of age.⁵ It was found to be effective and well tolerated, poorly absorbed through the skin, and rapidly metabolized.^{1,4,5} Permethrin acts by disrupting the sodium channel current, resulting in delayed repolarization, causing paralysis and death of the parasite in all stages.³

Therapeutic use and effectiveness

Permethrin has been used as a first-line treatment of scabies in patients older than 2 months of age. It is available as a 5% cream, which should be applied overnight or for at least 8 to 12 hours, then washed off and the process repeated a week later. Permethrin should be applied to the entire body (including the head in infants).^{3,5}

A Cochrane review of 20 randomized controlled trials involving 2392 participants (3 trials included only adults, 6 included only children, and 11 included both) evaluated topical and systemic drugs for treating scabies.⁷ One trial was placebo controlled; 16 compared 2 or more treatments; 2 compared treatment regimens; and 1 compared different drug vehicles. The primary outcome was treatment failure on follow-up (7 to 28 days). Persistence of itch was a secondary outcome.⁷ The review found fewer treatment failures with permethrin than with crotamiton, lindane, and ivermectin. In 2 trials (N=194) permethrin was superior to crotamiton (95% confidence interval [CI], 0.10 to 0.55). Another 5 trials (N=753) found permethrin to be superior to lindane (95% CI, 0.13 to 0.75). One trial (N=85) reported more treatment failures with ivermectin than with permethrin (95% CI, 1.84 to 99.26).

Strong and Johnstone⁷ suggested that permethrin was more effective than topical crotamiton, lindane, and oral

ivermectin. The Cochrane review also found that permethrin was more effective in reducing skin irritation than crotamiton (95% CI, 0.11 to 0.65; N=94) and lindane (95% CI, 0.44 to 0.87; N=490). No difference in treatment failure or skin irritation was found between permethrin and natural pyrethrin.⁷ The review concluded that topical permethrin appears to be the most effective treatment of scabies.⁷

Another prospective, multicentre, single-arm study of 13 centres (103 participants, 34% children) evaluated the efficacy of 5% permethrin in adults and children older than 3 months of age with scabies.⁹ All participants were treated once with 5% permethrin cream at the initial visit; follow-up examination was performed within 2 days of day 14 and within 3 days of day 28. A second application of permethrin was administered to 27 patients (who were not considered cured or had contact with untreated scabies) within 2 days of day 14. The primary outcome measure was cure rate at 28 days. The study found that the cure rate within 3 days of day 28 was 95.1% (95% CI, 91.0% to 99.3%). Hamm et al concluded that 5% permethrin is highly effective in adults and children with scabies.⁹

Safety

Permethrin is poorly absorbed through the skin.⁴ An experimental study to determine the systemic exposure to permethrin following topical administration concluded that the extent of systemic exposure after therapeutic administration is very low and elimination is virtually complete after a week.¹⁰ Local skin irritations, such as pruritus, burning sensations, or tingling, have occasionally been reported, but all are of short duration and might be indistinguishable from the symptoms of the skin infestation.^{3,4,11}

There have been few reports of human pyrethroid poisoning. The main adverse effect of dermal exposure is paresthesia, which is usually of short duration and self-limiting.¹¹ Systemic effects generally occur after inappropriate occupational handling or intentional or accidental ingestion, with few reported deaths.¹¹

Emerging resistance

Drug resistance in scabies is an emerging concern.⁴ Potential mechanisms for resistance to permethrin include sodium channel mutations, removal of the drug by an enhanced efflux pump such as P-glycoprotein, and metabolic degradation of the drug.⁴ Evidence from in vitro studies demonstrated progressively reduced susceptibility to permethrin in mites collected from an indigenous community, where mass drug distribution had been deployed.^{12,13} However, there has been no documented evidence of any resistance of scabies to permethrin in vivo.¹²


Adding synergists to counteract metabolic resistance is effective for managing pesticide resistance.¹³

Guidelines

The Canadian Paediatric Society and the Centers for Disease Control and Prevention recommend permethrin

cream (5%) as first-line therapy for patients older than 2 months of age.^{8,14,15} Sulfur (7%) is a safe alternative for young infants.⁸ Lindane cream or lotion should be used with caution in children younger than 2 years of age.^{8,14,15}

Conclusion

Permethrin 5% cream is effective, safe, and well tolerated for the treatment of scabies in children older than 2 months of age. Guidelines recommend 7% sulfur for younger infants. A single application of 5% permethrin to the entire body (including the head in infants) is usually curative, but a second application is recommended 1 to 2 weeks later. Parents should be warned about potential rare side effects, including irritation, burning sensation, or tingling, which are usually self-limiting. 

Competing interests

None declared

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References

- Andrews RM, McCarthy J, Carapetis JR, Currie BJ. Skin disorders, including pyoderma, scabies and tinea infections. *Pediatr Clin North Am* 2009;56(6):1421-40.
- Karthikeyan K. Scabies in children. *Arch Dis Child Educ Pract Ed* 2007;92(3):e65-9.
- Hicks MI, Elston DM. Scabies. *Dermatol Ther* 2009;22(4):279-92.
- Currie BJ, McCarthy JS. Permethrin and ivermectin for scabies. *N Engl J Med* 2010;362(8):717-25.
- Diamantis SA, Morrell DS, Burkhart CN. Pediatric infestations. *Pediatr Ann* 2009;38(6):326-32.
- Knowles S, Shear NH. Scabies and pediculosis. In: Gray J, editor. *Therapeutic choices*. 5th ed. Ottawa: ON: Canadian Pharmacists Association; 2007. p.1089-97.
- Strong M, Johnstone PW. Interventions for treating scabies. *Cochrane Database Syst Rev* 2007;3:CD000320.
- Canadian Paediatric Society [website]. *Scabies management*. Ottawa, ON: Canadian Paediatric Society; 2009. Available from: www.cps.ca/english/statements/II/ii01-01.htm. Accessed 2010 Aug 26.
- Hamm H, Beiteke U, Höger PH, Seitz CS, Thaci D, Sunderkötter C. Treatment of scabies with 5% permethrin cream: results of a German multicenter study. *J Dtsch Dermatol Ges* 2006;4(5):407-13.
- Tomalik-Scharte D, Lazar A, Miens J, Bastian B, Ihrig M, Wachall B, et al. Dermal absorption of permethrin following topical administration. *Eur J Clin Pharmacol* 2005;61(5-6):399-404. Epub 2005 Jun 10.
- Bradberry SM, Cage SA, Proudfoot AT, Vale JA. Poisoning due to pyrethroids. *Toxicol Rev* 2005;24(2):93-106.
- Walton SF, Myerscough MR, Currie BJ. Studies in vitro on the relative efficacy of current acaricides for *Sarcoptes scabiei* var. *hominis*. *Trans R Soc Trop Med Hyg* 2000;94(1):92-6.
- Passay C, Arlian L, Morgan M, Gunning R, Rossiter L, Holt D, et al. The effect of insecticide synergists on the response of scabies mites to pyrethroid acaricides. *PLoS Negl Trop Dis* 2009;3(1):e354. Epub 2009 Jan 6.
- Centers for Disease Control and Prevention [website]. *Sexually transmitted diseases treatment guidelines, 2006*. Atlanta, GA: Centers for Disease Control and Prevention; 2006. Available from: www.cdc.gov/mmwr/preview/mmwrhtml/rr5511a1.htm. Accessed 2010 Aug 26.
- Centers for Disease Control and Prevention [website]. *Scabies. Suggested guidelines*. Atlanta, GA: Centers for Disease Control and Prevention; 2008. Available from: www.cdc.gov/scabies/hcp/index.html. Accessed 2010 Aug 26.



Child Health Update is produced by the Pediatric Research in Emergency Therapeutics (PRETx) program (www.pretx.org) at the BC Children's Hospital in Vancouver, BC. Dr Albakri is a member and Dr Goldman is Director of the PRETx program. The mission of the PRETx program is to promote child health through evidence-based research in therapeutics in pediatric emergency medicine.

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